

What is claimed is:

1. An oil emulsion, comprising:
 - a. an oil component;
 - b. an emulsifier;
 - 5 c. an emulsion stabilizer; and
 - d. water.
2. The oil emulsion, as claimed in Claim 1, wherein the oil component comprises polyunsaturated fatty acids.
3. The oil emulsion, as claimed in Claim 1, wherein the oil component
10 comprises polyunsaturated fatty acids having at least three double bonds and a chain length of at least 18 carbons.
4. The oil emulsion, as claimed in Claim 1, wherein the oil component comprises a fatty acid selected from the group consisting of linolenic acid, stearidonic acid, arachidonic acid, eicosapentaenoic acid, docosapentaenoic acid, docosahexaenoic
15 acid and mixtures thereof.
5. The oil emulsion, as claimed in Claim 1, wherein the oil component comprises an oil from a source selected from the group consisting of plants, genetically modified plants, microbial oils, genetically modified microbial oils, fish oils and mixtures thereof.
- 20 6. The oil emulsion, as claimed in Claim 5, wherein the plants are selected from the group consisting of algae, flaxseeds, rapeseeds, corn, evening primrose, soy, sunflower, safflower, palm, olive, canola, borage and mixtures thereof.
7. The oil emulsion, as claimed in Claim 5, wherein the genetically modified plants and genetically modified microbial oils are genetically modified by the
25 introduction or modification of polyketide synthase genes.
8. The oil emulsion, as claimed in Claim 1, wherein the oil component comprises an oil from a microbial source selected from the group consisting of Thraustochytriales, dinoflagellates, and fungal sources.
9. The oil emulsion, as claimed in Claim 1, wherein the emulsifier is
30 selected from the group consisting of polysorbate esters, lecithin, monoglycerides, diglycerides, organic acid esters of monoglycerides, propylene glycol esters of fatty acids, polyglycerol esters of fatty acids, propylene glycol monostearate, sorbitan monostearate, sorbitan trioleate, and sodium lauryl sulfate and mixtures thereof.

10. The oil emulsion, as claimed in Claim 1, wherein the emulsifier is selected from the group consisting of polysorbate esters, lecithin and mixtures thereof.

11. The oil emulsion, as claimed in Claim 1, wherein the emulsifier and the oil are from the same source.

12. The oil emulsion, as claimed in Claim 1, wherein the stabilizer is selected from the group consisting of xanthan gum, alginate, gellan gum, carboxy methyl cellulose, chitin and mixtures thereof.

13. The oil emulsion, as claimed in Claim 1, further comprising an antimicrobial component.

14. The oil emulsion, as claimed in Claim 12, wherein the antimicrobial component is selected from the group consisting of propylene glycol, potassium sorbate, sodium benzoate, ascorbic acid, phosphoric acid, citric acid and mixtures thereof.

15. The oil emulsion, as claimed in Claim 1, wherein the weight ratio of oil component to the emulsifier is between about 1:1 and about 99:1.

16. The oil emulsion, as claimed in Claim 1, wherein the weight ratio of oil component to the emulsifier is about 6:1.

17. The oil emulsion, as claimed in Claim 1, wherein the ratio of water to emulsion stabilizer is between about 1:0.1 to about 1:0.001.

18. The oil emulsion, as claimed in Claim 1, wherein the ratio of water to emulsion stabilizer is between about 1:0.05 to about 1:0.005.

19. The oil emulsion, as claimed in Claim 1, wherein the ratio of oil component to water is between about 2:1 to about 1:25.

20. The oil emulsion, as claimed in Claim 1, wherein the oil emulsion is physically stable for at least about 30 days.

21. The oil emulsion, as claimed in Claim 19, wherein the oil emulsion is physically stable for at least about 30 days at a pH range from about 3 to about 4.

22. The oil emulsion, as claimed in Claim 19, wherein the oil emulsion is physically stable for at least about 30 days at a temperature range of about 4 C.

23. The oil emulsion, as claimed in Claim 1, wherein the oil emulsion is chemically stable for at least about 30 days.

24. The oil emulsion, as claimed in Claim 22, wherein the oil emulsion is chemically stable for at least about 30 days at a pH range from about 3 to about 4.

25. The oil emulsion, as claimed in Claim 22, wherein the oil emulsion is chemically stable for at least about 30 days at a temperature range of about 4 C.

26. The oil emulsion, as claimed in Claim 1, wherein the emulsion is an oil-in-water emulsion.

27. The oil emulsion, as claimed in Claim 1, wherein the emulsion has not been heat treated.

28. The oil emulsion, as claimed in Claim 1, wherein oil emulsion has a total bacteria count of <20 MPN/gram.

29. The oil emulsion, as claimed in Claim 1, wherein the emulsion further comprises functionally active ingredients.

30. The oil emulsion, as claimed in Claim 28, wherein the functionally active ingredients are selected from the group consisting of flavors, pigments, sweeteners, and antioxidants.

31. The oil emulsion, as claimed in Claim 1, wherein the emulsion further comprises bioactive ingredients.

32. The oil emulsion, as claimed in Claim 30, wherein the bioactive ingredients are selected from the group consisting of vitamins, minerals, pre-biotic compounds, pro-biotic compounds and nutraceuticals.

33. A product selected from the group consisting of a food product, a cosmetic product, a pharmaceutical product, a nutraceutical product, and an industrial product, wherein the product comprises the oil emulsion as claimed in Claim 1.

34. The product, as claimed in Claim 33, wherein the product is a food product selected from the group consisting of liquid food products and solid food products.

35. The food product, as claimed in Claim 34, wherein the food product is a liquid food product selected from the group consisting of beverages, energy drinks, infant formula, liquid meals, fruit juices, multivitamin syrups, meal replacers, medicinal foods, and infant syrups.

36. The food product, as claimed in Claim 33, wherein the food product is a solid food product selected from the group consisting of baby food, yogurt, cheese, cereal, pancake mixes, baked goods, food bars, processed meats, ice creams, frozen desserts, frozen yogurts, waffle mixes, and replacement egg mixes.

37. The product, as claimed in Claim 33, wherein the product is a cosmetic product.

38. The product, as claimed in Claim 33, wherein the product is a pharmaceutical product.

39. The product, as claimed in Claim 33, wherein the product is a nutraceutical product.

40. The product, as claimed in Claim 33, wherein the product is an industrial product.

41. A method of forming an emulsion, comprising combining:

- a. an oil component;
- b. an emulsifier;
- c. an emulsion stabilizer; and
- d. water.

42. The method, as claimed in Claim 41, wherein the oil component and emulsifier are combined, the emulsion stabilizer and the water are combined; and the oil component/emulsifier combination and the emulsion stabilizer/water combination are combined.

43. The method, as claimed in Claim 42, wherein the oil component/emulsifier combination is made with high shear mixing and the combination of the oil component/emulsifier combination and the emulsion stabilizer/water combination is made with high shear mixing.

44. The method, as claimed in Claim 41, wherein the oil component comprises polyunsaturated fatty acids.

45. The method, as claimed in Claim 41, wherein the oil component comprises polyunsaturated fatty acids having at least three double bonds and a chain length of at least 18 carbons.

46. The method, as claimed in Claim 41, wherein the oil component comprises a fatty acid selected from the group consisting of linolenic acid, stearidonic acid, arachidonic acid, eicosapentaenoic acid, docosapentaenoic acid, docosahexaenoic acid and mixtures thereof.

47. The method, as claimed in Claim 41, wherein the oil component comprises an oil from a source selected from the group consisting of plants, genetically

modified plants, microbial oils, genetically modified microbial oils, fish oils and mixtures thereof.

48. The method, as claimed in Claim 47, wherein the plants are selected from the group consisting of algae, flaxseeds, rapeseeds, corn, evening primrose, soy, sunflower, safflower, palm, olive, canola, borage and mixtures thereof.

49. The method, as claimed in Claim 47, wherein the genetically modified plants and genetically modified microbial oils are genetically modified by the introduction or modification of polyketide synthase genes.

50. The method, as claimed in Claim 41, wherein the oil component comprises an oil from a microbial source selected from the group consisting of Thraustochytriales, dinoflagellates, and fungal sources.

51. The method, as claimed in Claim 41, wherein the emulsifier is selected from the group consisting of polysorbate esters, lecithin, monoglycerides, diglycerides, organic acid esters of monoglycerides, propylene glycol esters of fatty acids, polyglycerol esters of fatty acids, propylene glycol monostearate, sorbitan monostearate, sorbitan trioleate, and sodium lauryl sulfate.

52. The method, as claimed in Claim 41, wherein the emulsifier is selected from the group consisting of polysorbate esters, lecithin and mixtures thereof.

53. The method, as claimed in Claim 41, wherein the emulsifier and the oil are from the same source.

54. The method, as claimed in Claim 41, wherein the stabilizer is selected from the group consisting of xanthan gum, alginate, gellan gum, carboxy methyl cellulose, chitin and mixtures thereof.

55. The method, as claimed in Claim 41, further comprising an antimicrobial component.

56. The method, as claimed in Claim 55, wherein the antimicrobial component is selected from the group consisting of propylene glycol, potassium sorbate, sodium benzoate, ascorbic acid, phosphoric acid, citric acid and mixtures thereof.

57. The method, as claimed in Claim 41, wherein the weight ratio of oil component to the emulsifier is between about 1:1 and about 99:1.

58. The method, as claimed in Claim 41, wherein the weight ratio of oil component to the emulsifier is about 6:1.

59. The method, as claimed in Claim 41, wherein the ratio of water to emulsion stabilizer is between about 1:0.1 to about 1:0.001.

60. The method, as claimed in Claim 41, wherein the ratio of water to emulsion stabilizer is between about 1:0.05 to about 1:0.005.

5 61. The method, as claimed in Claim 41, wherein the ratio of oil component to water is between about 2:1 to about 1:25.

62. The method, as claimed in Claim 41, wherein the emulsion is physically stable for at least about 30 days

63. The method, as claimed in Claim 62, wherein the emulsion is physically
10 stable for at least about 30 days at a pH range from about 3 to about 4.

64. The method, as claimed in Claim 62, wherein the emulsion is physically stable for at least about 30 days at a temperature range of about 4 C.

65. The method, as claimed in Claim 41, wherein the emulsion is chemically stable for at least about 30 days.

15 66. The method, as claimed in Claim 65, wherein the emulsion is chemically stable for at least about 30 days at a pH range from about 3 to about 4.

67. The method, as claimed in Claim 65, wherein the emulsion is chemically stable for at least about 30 days at a temperature range of about 4 C.

68. The method, as claimed in Claim 41, wherein the emulsion is an oil-in-
20 water emulsion.

69. The method, as claimed in Claim 41, wherein the emulsion has not been heat treated.

70. The method, as claimed in Claim 41, wherein the emulsion has a total bacteria count of <20 MPN/gram.

25 71. The method, as claimed in Claim 41, wherein the emulsion further comprises functionally active ingredients.

72. The method, as claimed in Claim 71, wherein the functionally active ingredients are selected from the group consisting of flavors, pigments, sweeteners and antioxidants.

30 73. The method, as claimed in Claim 41, wherein the emulsion further comprises bioactive ingredients.

74. The method, as claimed in Claim 73, wherein the bioactive ingredients are selected from the group consisting of vitamins, minerals, pre-biotic compounds, probiotic compounds and nutraceuticals.

75. A process for preparing a product selected from the group consisting of a food product, a cosmetic product, a pharmaceutical product, a nutraceutical product, and an industrial product, wherein the process comprises the method as claimed in Claim 41.

76. The process, as claimed in Claim 75, wherein the product is a food product selected from the group consisting of liquid food products and solid food products.

77. The process, as claimed in Claim 76, wherein the food product is a liquid food product selected from the group consisting of beverages, energy drinks, infant formula, liquid meals, fruit juices, multivitamin syrups, meal replacers, medicinal foods, and infant syrups.

78. The process, as claimed in Claim 76, wherein the food product is a solid food product selected from the group consisting of baby food, yogurt, cheese, cereal, pancake mixes, baked goods, food bars, processed meats, ice creams, frozen desserts, frozen yogurts, waffle mixes, and replacement egg mixes.

79. The process, as claimed in Claim 75, wherein the product is a cosmetic product.

80. The process, as claimed in Claim 75, wherein the product is a pharmaceutical product.

81. The process, as claimed in Claim 75, wherein the product is a nutraceutical product.

82. The process, as claimed in Claim 75, wherein the product is an industrial product.

83. An oil emulsion, comprising:

a. an oil component comprising polyunsaturated fatty acids having at least three double bonds and a chain length of at least 18 carbons;

b. an emulsifier;

c. an emulsion stabilizer;

d. water; and

e. an antimicrobial component;

wherein the weight ratio of oil component to the emulsifier is between about 1:1 and about 99:1;

wherein the ratio of water to emulsion stabilizer is between about 1:0.1 to about 1:0.001;

5 wherein the ratio of oil component to water is between about 2:1 to about 1:25; and

wherein the oil emulsion is physically and chemically stable for at least about 30 days.

84. The oil emulsion, as claimed in Claim 83, wherein the oil component
10 comprises an oil from a microbial source selected from the group consisting of Thraustochytriales, dinoflagellates, and fungal sources.

85. The oil emulsion, as claimed in Claim 83, wherein the emulsifier is selected from the group consisting of polysorbate esters, lecithins and mixtures thereof.

86. The oil emulsion, as claimed in Claim 83, wherein the stabilizer is
15 selected from the group consisting of xanthan gum, alginate, gellan gum, carboxy methyl cellulose, chitin and mixtures thereof.

87. The oil emulsion, as claimed in Claim 83, wherein the antimicrobial component is selected from the group consisting of propylene glycol, potassium sorbate, sodium benzoate, ascorbic acid, phosphoric acid, citric acid and mixtures thereof.

20 88. The oil emulsion, as claimed in Claim 83, wherein the weight ratio of oil component to the emulsifier is about 6:1.

89. The oil emulsion, as claimed in Claim 83, wherein the ratio of water to emulsion stabilizer is between about 1:0.05 to about 1:0.005.

90. A product selected from the group consisting of a food product, a
25 cosmetic product, a pharmaceutical product, a nutraceutical product, and an industrial product, wherein the product comprises the oil emulsion as claimed in Claim 83.